

WHAT IS CLAIMED IS:

1. In a web-fed offset printing press for printing on a continuous web of paper or like material traveling along a predefined path at a predetermined speed, in combination:

- 5 (a) a plate cylinder split into a pair of halves for printing a pair of images in juxtaposition transversely of the web, the pair of halves of the plate cylinder being capable of independent displacement both axially and circumferentially of the plate cylinder;
- 10 (b) a blanket cylinder in rolling contact with the plate cylinder;
- (c) axial adjustment means for causing axial displacement of each half of the plate cylinder independently of the other half with a view to fine positioning of each of the pair of images transversely of the web;
- 15 (d) circumferential adjustment means for causing circumferential displacement of a preselected one of the halves of the plate cylinder relative to the other half with a view to fine positioning of one of the pair of images longitudinally of the web; and
- 20 (e) drive means for jointly driving the plate cylinder and the blanket cylinder in opposite directions at a predetermined speed during printing, and for adjustably varying the rotational speed of the plate cylinder with respect to the traveling speed of the web with a view to positioning of the pair of images longitudinally of the web.

2. A web-fed, multicolor, offset printing press having a series of printing units for printing different color images on a continuous web of paper or like material traveling along a predefined path at a predetermined speed, each printing unit comprising:

- (a) a plate cylinder split into a pair of halves for printing a pair of images in juxtaposition transversely of the web, the pair of halves of the plate cylinder being capable of independent displacement both axially and circumferentially of the plate cylinder for registration of the pair of images printed on the web with the other pairs of images printed by the other printing units;
- (b) a blanket cylinder in rolling contact with the plate cylinder;
- (c) a first pair of helical gears coaxially coupled to opposite ends of the plate cylinder for joint rotation therewith;
- (d) a second pair of helical gears coaxially coupled to opposite ends of the blanket cylinder for joint rotation therewith, the second pair of helical gears being each in mesh with one of the first pair of helical gears for joint rotation of the plate cylinder and the blanket cylinder in opposite directions;
- (e) axial adjustment means for causing axial displacement of each half of the plate cylinder independently of the other half with a view to fine positioning of each of the pair of images transversely of the web;
- (f) circumferential adjustment means coupled to one of the first pair of helical gears for causing circumferential displacement of one of the halves of the plate cylinder relative to the other half by

causing axial displacement of said one of the first pair of helical gears in sliding engagement with one of the second pair of helical gears, with a view to fine positioning of one of the pair of images longitudinally of the web; and

5 (g) drive means drivingly coupled to either of the first and the second pairs of helical gears for jointly driving the plate cylinder and the blanket cylinder in opposite directions at a predetermined speed during printing, and for adjustably varying the rotational speed of the plate cylinder with respect to the predetermined traveling speed of the web with a view to approximate and fine positionings of the pair of images longitudinally of the web.

10 3. The printing press of claim 2 wherein the plate cylinder has a pair of trunnions coaxially coupled one to each half thereof, and wherein the axial adjustment means comprises a pair of axial adjustments coupled one to each half of the plate cylinder of each printing unit, each axial adjustment comprising:

(a) frame means;

20 (b) an axial adjustment motor mounted to the frame means, the axial adjustment motor being capable of bidirectional rotation;

(c) a sleeve coaxially and rotatably mounted to one trunnion of the plate cylinder and constrained to axial displacement therewith and hence with one half of the plate cylinder relative to the frame means, the sleeve being driven for bidirectional rotation

from the axial adjustment motor; and

- (d) screw thread means acting between the frame means and the sleeve for causing the sleeve to travel axially back and forth with said one plate cylinder half upon bidirectional rotation of the sleeve.

4. The printing press of claim 2 wherein the plate cylinder has a pair of trunnions coaxially coupled one to each half thereof, and wherein the circumferential adjustment means comprises:

- (a) frame means;
- (b) a circumferential adjustment motor mounted to the frame means, the circumferential adjustment motor being capable of bidirectional rotation;
- (c) a first annular gear nonrotatably mounted to one trunnion of the plate cylinder;
- (d) a second annular gear concentrically surrounding the first annular gear and engaged therewith for joint rotation while being free to travel axially relative to the same, one of the first pair of helical gears being concentrically and nonrotatably mounted to the second annular gear;
- (e) a sleeve coaxially and rotatably mounted to the second annular gear and constrained to axial displacement therewith and hence with one of the first pair of helical gears, the sleeve being driven for bidirectional rotation from the circumferential adjustment motor; and

(f) screw thread means acting between the frame means and the sleeve for causing the sleeve to travel axially back and forth with the second annular gear, and hence with said one of the first pair of helical gears, upon bidirectional rotation of the sleeve, said one helical gear on axial displacement being displaced circumferentially with one half of the plate cylinder by virtue of its engagement with one of the second pair of helical gears on the opposite ends of the blanket cylinder.

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10 5. The printing press of claim 2 wherein the plate cylinder has a pair of trunnions coaxially coupled one to each half thereof, and wherein the axial adjustment means comprises a pair of axial adjustments coupled one to each half of the plate cylinder of each printing unit, each axial adjustment comprising:

15 (a) frame means

(b) an axial adjustment motor mounted to the frame means, the axial adjustment motor being capable of bidirectional rotation;

(c) a first sleeve mounted fast to the frame means, the first sleeve being threaded internally;

20 (d) a threaded rod extending through the first sleeve in threaded engagement therewith, the threaded rod being driven for bidirectional rotation from the axial adjustment motor and, on rotation, undergoing axial displacement by virtue of its threaded engagement with the first sleeve; and

25 (e) a second sleeve coaxially secured to one of the trunnions and coaxially coupled to the threaded rod so as to permit rotation of

the latter while being constrained to joint axial displacement with the threaded rod.

5 6. The printing press of claim 5 wherein the circumferential adjustment means comprises:

(a) a circumferential adjustment motor mounted to the frame means, the circumferential adjustment motor being capable of bidirectional rotation;

10 (b) a third sleeve concentrically mounted to the threaded rod of one of the axial adjustment means and threadedly engaged therewith, the third sleeve being driven for bidirectional rotation from the circumferential adjustment motor and, on rotation, undergoing axial displacement by virtue of its threaded engagement with the threaded rod; and

15 (c) a fourth sleeve coaxially and rotatably coupled to the third sleeve and constrained to axial displacement therewith, the fourth sleeve being coaxially and nonrotatably coupled to the second sleeve of one of the axial adjustment means while being free to travel axially relative to the second sleeve;

20 (d) one of the first pair of helical gears being concentrically and nonrotatably mounted to the fourth sleeve and, on axial displacement with the fourth sleeve, being displaced circumferentially with one half of the plate cylinder by virtue of its engagement with one of the second pair of helical gears on
25 the opposite ends of the blanket cylinder.

7. A web-fed, multicolor, offset perfecting printing press having a series of printing units for printing different color images on both sides of a continuous web of paper or like material traveling along a prede-
5 fined path at a predetermined speed, each printing unit comprising:

- (a) a pair of plate cylinders each split into a pair of halves for printing a pair of images in juxtaposition transversely of the web, the pair of halves of each plate cylinder being capable of independent displacement both axially and circumferentially of the plate cylinder for registration of the pair of images printed on one side of the web with the other pairs of images printed on the same side of the web by the other printing units;
- (b) a pair of blanket cylinders in rolling contact one with each plate cylinder, the pair of blanket cylinders being held against each other via the web being printed upon;
- (c) a first pair of helical gears coaxially coupled to opposite ends of each plate cylinder for joint rotation therewith;
- (d) a second pair of helical gears coaxially coupled to opposite ends of each blanket cylinder for joint rotation therewith, the second pair of helical gears on each blanket cylinder being each in mesh with one of the first pair of helical gears on one plate cylinder for joint rotation of the plate cylinder and the blanket cylinder in opposite directions;
- (e) axial adjustment means for causing axial displacement of each half of each plate cylinder independently of the other half

thereof with a view to fine positioning of each of the pair of images transversely of the web;

5 (f) circumferential adjustment means coupled to one of the first pair of helical gears on each plate cylinder for causing circumferential displacement of one of the halves of the plate cylinder relative to the other half thereof by causing axial displacement of said one of the first pair of helical gears in sliding engagement with one of the second pair of helical gears on one associated blanket cylinder, with a view to fine positioning of one of the pair of images longitudinally of the web;

10 (g) first drive means drivingly coupled to either of the first and the second pairs of helical gears on one plate cylinder and one blanket cylinder for jointly driving said one plate cylinder and said one blanket cylinder in opposite directions at a predetermined speed during printing, and for adjustably varying the rotational speed of said one plate cylinder with respect to the predetermined traveling speed of the web with a view to approximate and fine positionings of the pair of images longitudinally of the web; and

15 20 (h) second drive means drivingly coupled to either of the first and the second pairs of helical gears on the other plate cylinder and the other blanket cylinder for jointly driving said other plate cylinder and said other blanket cylinder in opposite directions at the predetermined speed during printing, and for adjustably varying the rotational speed of said other plate cylinder with re-

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spect to the predetermined traveling speed of the web with a view to approximate and fine positionings of the pair of images longitudinally of the web.

- 5 8. The printing press of claim 7 wherein each of the first and the second drive means includes a cylinder drive motor coupled to one of the second pair of helical gears on one associated blanket cylinder via an intermediate gear of coaxial arrangement with one associated plate cylinder.